

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a disk drive device, a hard disk drive, etc.

[0002]

[Description of the Prior Art] As main storage locations of the data in computer paraphernalia, it is well known that the hard disk drive is used abundantly. Drawing 8 shows the typical example of the structure of a hard disk drive. Disk enclosure is constituted from the hard disk drive 1 shown in this figure by the base 2 of closed-end case shape opened in the upper part, and covering (with no graphic display) which plugs up the opening of the upper part of this base 2. In this disk enclosure, it has the magnetic disk 4 of the specified number supported by the spindle motor 3 of hub yne structure at the base 2 side.

This magnetic disk 4 is rotated with predetermined revolving speed with the spindle motor 3.

The actuator 5 is formed in the base 2. This actuator 5 is attached to the base 2 via the pivot 6 in pars intermedia, enabling free rotation. The magnetic head 7 for writing the data stored in the magnetic disk 4 is formed in the tip part of this actuator 5. The voice coil 8 is formed in the rear end part of the actuator 5. On the other hand, the voice coil 8 and the stator 9 which has two incomes counter the voice coil 8, and is provided in the base 2.

A voice coil motor is constituted by these voice coils 8 and the stator 9.

By supplying current to the voice coil 8, this voice coil motor uses the magnetism produced between the stators 9, and rotates the actuator 5 to the circumference of the pivot 6.

[0003] By the way, the stoppers 10 and 11 for restricting the rotating extent of the actuator 5 by each by the side of the inner circumference of the magnetic disk 4 and a periphery were conventionally attached to the base 2. The stopper 10 which regulates the rotation by the side of the inner circumference of the magnetic disk 4 of the actuator 5, When writing servo data in the top clamp 12 which fixes the magnetic disk 4 to the spindle motor 3 to the function and the magnetic disk 4 to which the actuator 5 is not contacted, it has the function to secure the position arrangement accuracy of the actuator 5. In the load unloading type used abundantly in recent years, especially the stopper 11 that regulates the rotation by the side of the periphery of the magnetic disk 4 of the actuator 5 has a function kept from passing the lamp 13 held where the magnetic head 7 is evacuated. In order that this stopper 11 may maintain the state where the magnetic head 7 was made to stand it still on the lamp 13, it contains a magnet and is provided also with the function which draws the actuator 5 by that magnetism.

[0004] Such a stopper 11 forms a mounting hole in the base 2 conventionally, The structure fixed by inserting this boss in the hole which formed [fixed by inserting in this mounting hole the pin formed in the stopper 11 side] the boss (projection) in the base 2, and was formed in the stopper 11 was adopted. By the way, especially the stopper 10 that regulates the rotation by the side of the inner circumference of the magnetic disk 4 of the actuator 5 needed to be attached to the base 2 in high accuracy. When this writes servo data in the magnetic disk 4 by the magnetic head 7, it is because the state where the

actuator 5 was applied to the stopper 10 is written in and it is considered as the position of a standard. In connection with the densification of the record over the magnetic disk 4 in recent years, the positioning accuracy tends to increase more. For this reason, the attaching accuracy over the base 2 of the stopper 10 needed to be raised, and, usually the mounting eye side and boss of the stopper 10 were conventionally formed in the base 2 by cutting.

[0005]

[Problem(s) to be Solved by the Invention]However, it becomes the increase in efficiency of the manufacturing process of a hard disk drive, and the hindrance of cost reduction to carry out additional processing to the base 2 generally cast, in order to form the mounting eye side and boss of the stopper 10. In order to have to attach the two stoppers 10 and 11 to the base 2, the time and effort is taken and this also serves as hindrance of the increase in efficiency of a manufacturing process. In addition, the miniaturization of the hard disk drive is progressing and reservation of the space for attaching the stoppers 10 and 11 in a small hard disk drive especially may be difficult in recent years. Although what the two stoppers 10 and 11 are connected and unifies to the above problems is considered, this cannot solve all problems, either and problems, such as the necessity for the additional processing for securing the problem of a space and the attaching accuracy over the base 2, will still remain. This invention was made based on such a technical technical problem, and an object of this invention is to provide the disk drive device which can attain increase in efficiency of a manufacturing process, cost reduction, space-saving-ization, etc., a hard disk drive, etc.

[0006]

[Means for Solving the Problem]A basis of this purpose, and a disk drive device of this invention, A head which performs read-out and writing of data to a disk like medium equips an actuator with which it was equipped with a holder part of a couple which projects from the rotating shaft side to the periphery side, and is located on the same circumference, and is provided with a stopper fixed to the case side between holder parts of these couples. Thereby, if an actuator rotates, rotation of an actuator will be regulated when a holder part of a couple hits a stopper. By this, by hitting one holder part, a stopper will regulate the one end side of rotating extent of an actuator, and will regulate the other end side of rotating extent by hitting a holder part of another side. A stopper can also be equipped with a holddown member which fixes an actuator after one holder part has hit a stopper at one. In the case of what is called a load unloading type provided with a lamp which holds a head in the state where it was made to evacuate from a disk like medium, by this of disk drive device, the state where a head was located in the shape of a lamp is maintainable. Such composition enables it to fix an actuator by the end side of rotating extent of an actuator, even if it is not a load unloading type. Such a disk drive device may be a hard disk drive, and as long as an actuator rotates along with a disk like medium, it may be a disk drive device of other kinds. A disk like medium is not restricted to a magnetic disk, either, and a magneto-optical disc, a recording disk of a kind of further others, etc. go into the category.

[0007]An actuator which makes a magnetic head seek on a disk like medium when a hard disk drive concerning this invention rotates a pivot as a center, It is provided in rotating extent of this actuator, and has a stopper which has a function which regulates a seeking range over the inner circumference side of a disk like medium of a magnetic head, and a

function which regulates a seeking range over the periphery side. That is, a stopper has at least two functions. For the purpose, as for a stopper, it is preferred to equip one with the inner circumference side restricting part which regulates rotation of a magnetic head by the side of inner circumference of a disk like medium, and the periphery side restricting part which regulates rotation of a magnetic head by the side of a periphery of a disk like medium. It is preferred by forming a holder part of a couple in an actuator and making a stopper contact this holder part to regulate rotation of an actuator. In order to form such a stopper in rotating extent of an actuator, more specifically, it is preferred to form a holder part of a couple in an arm of a couple which holds a voice coil of a voice coil motor with an actuator. As for a stopper, when this hard disk drive is provided with a lamp which holds a magnetic head in the state where it was made to evacuate from a disk like medium, it is preferred to have a magnet which fixes an actuator where a magnetic head is held at a lamp. By this, in addition to the two above-mentioned functions, a stopper will have a total of three functions.

[0008]It can also regard as a head drive unit provided with a head which write data for this invention to a disk like medium, an actuator which makes this head seek on a disk like medium, and a voice coil motor made to rotate an actuator to a circumference of a rotation center. In this case, this head drive unit is the feature and having a stopper which regulates rotating extent of an actuator when seeking a head further, An actuator is equipped with an arm of a couple for supporting a voice coil, and a stopper is formed so that it may be located between arms of a couple of these actuators. By the way, although such a head drive unit is applicable to a disk drive device of a type having disk like media, such as what is called a hard disk drive, it can apply a disk like medium also to a disk drive device of a type which can be detached and attached free. The above-mentioned stopper can be considered as composition which has a holding part fixed to a stator which constitutes a voice coil motor, and a contact part which an arm contacts at the end of rotating extent when it projects from a stator and an actuator rotates. A stopper of such composition is fixable to a stator by forming a hole in a stator and inserting a holding part in this hole. Thereby, the necessity of fixing a stopper to the case side of a disk drive device is lost. Especially additional processing for fixing a stopper, if a stator is formed by press working of sheet metal and press working of sheet metal of the hole will be carried out simultaneously becomes unnecessary. By the way, a stopper can be equipped with adsorbing members, such as a magnet which adsorbs one arm. In this case, it is more preferred than a portion to which an arm of another side contacts a stopper to arrange an adsorbing member so that a portion which one arm contacts may be approached, so that adsorption power over arm of one of these can be demonstrated effectively.

[0009]This invention can also be regarded as a stopper simple substance which regulates rotating extent of an actuator which makes a head seek along with a disk like medium which constitutes a disk drive device. In that case, a portion which contacts when this stopper is pillar-shaped and an actuator reaches the end side of rotating extent, A stopper part which has a portion which contacts when an actuator reaches the other end side of rotating extent, It extends along an axis of a stopper part and has composition which has in one a holding part which fixes a stopper part to a disk drive device, and a magnet which adsorbs an actuator when an actuator reaches the end side of rotating extent and contacts a stopper part. And this stopper is attached by inserting said holding part in a

hole formed in the disk drive device side. In this case, as for a holding part, it is preferred to form omission prevention parts which project to the side and prevent an omission of a stopper from a hole. If a taper part which becomes thin is formed as it goes for a holding part at a tip, insertion to a hole can be performed easily. If a crevice formed in a tip part of a holding part along an axis of a holding part is formed, it can face inserting a holding part in a hole by the side of a disk drive device, and though omission prevention parts were formed, modification inside a crevice can be permitted, and it can insert easily.

[0010]

[Embodiment of the Invention] Hereafter, based on the embodiment shown in an accompanying drawing, this invention is explained in detail. Drawing 1 is a figure for explaining the hard disk drive (disk drive device) 20 in this embodiment. In the following explanation, about the composition which is common in the hard disk drive 1 shown in drawing 8, a same sign is attached and the explanation is omitted. As shown in drawing 1, the disk enclosure (case) 23 is constituted from the hard disk drive 20 in this embodiment by the base 21 of closed-end case shape opened in the upper part, and covering (with no graphic display) which plugs up the opening of the upper part of this base 21.

[0011] As shown in drawing 2, in this disk enclosure 23, on the spindle motor (disk driving source: with no graphic display) of the hub yne structure provided in the base 21 side, the magnetic disk (disk like medium) 4 of a specified number is laminated, and the top clamp 12 is fixed. And these magnetic disks 4 are rotated with predetermined revolving speed with this spindle motor.

[0012] The actuator 30 is formed in the disk enclosure 23. This actuator 30 is attached to the base 21 via the pivot (rotating shaft) 31 in pars intermedia, enabling free rotation. As shown in drawing 2, the magnetic head (head) 32 for writing the data stored in the magnetic disk 4 is formed in the tip part of this actuator 30. The voice coil (coil) 33 is formed in the rear end part of the actuator 30. This voice coil 33 is located between the coil retaining arm (a holder part, an arm) 34A of the couple which was prolonged in the shape of approximately radiation from about 31 pivot, and made the shape of an abbreviated V character, and 34B. In this embodiment, these coil retaining arms 34A and 34B, For example, it is formed of PPS (Polyphenylene Sulfide resins: thermoplastic engineering plastics), and has composition which carried out the exaggerated mold of the voice coil 33 of the coil retaining arms 34A and 34B and the meantime to one further.

[0013] The stator 40L of the up-and-down couple for making the base 21 generate a magnetic field between the voice coils 33 provided in the rear end part of the actuator 30, as shown in drawing 3, 40U is provided and the voice coil motor made to rotate the actuator 30 by these voice coils 33 and the stators 40L and 40U is constituted. By such composition, the actuator 30 can be moved now to the position which the pivot 31 was rotated as a center, and the magnetic head 32 sought to the abbreviated radial direction of the magnetic disk 4, and countered the track of the purpose of the magnetic disk 4 by the drive of the voice coil motor. In the hard disk drive 20 which adopts a load unload method, the lamp 13 held where the magnetic head 32 is evacuated from on the magnetic disk 4 to the periphery side is formed in the base 21.

[0014] As shown in drawing 4 (a), the stator 40L comprises the yoke 41 of plate shape, and the magnet 42 of the plate shape provided in the upper surface at one. The yoke 41 is formed so that it may project over the periphery side rather than the magnet 42, the

screwhole (with no graphic display) which lets the screw for fixing this stator 40L to the base 21 pass is formed in that undersurface, and the nail 43 which rises to two or more places of a peripheral part towards the upper part further is formed. In addition, the hole 44 for attaching to the yoke 41 the stopper 50 mentioned later is formed in the position. As shown in drawing 3, the upper stator 40U comprises the yoke 46 of plate shape, and a magnet (with no graphic display) of the plate shape provided in the undersurface at one like the lower stator 40L. The nail 47 prolonged caudad towards the peripheral part is formed in the yoke 46, and the interval of the upper stator 40U and the lower stator 40L is maintained by the prescribed dimension with these nails 47 and the nail 43 of the lower stator 40L. Furthermore, the screwhole 48 for thrusting the tip part of the screw (with no graphic display) which fixes the stator 40U to covering (with no graphic display) which constitutes the disk enclosure 23 is formed in the yoke 46.

[0015]The base 21 which constitutes the disk enclosure 23 is a plane view abbreviation rectangle, and is formed from the bottom plate 21a which forms that bottom, and the peripheral wall 21b which rises up in the peripheral part of this bottom plate 21a. And it has the composition that the magnetic disk 4, the actuator 30, the stators 40L and 40U, etc. are settled in the space surrounded by the peripheral wall 21b on the bottom plate 21a, and covering (with no graphic display) is attached to it at the upper surface of the peripheral wall 21b as shown in drawing 1.

[0016]The hard disk drive 20 which was described above is provided with the stopper 50 which regulates the rotating extent of the actuator 30. This stopper 50 is located between the coil retaining arm 34A of the actuator 30, and 34B. Here, the tip part of the coil retaining arms 34A and 34B is projected to the periphery side rather than the voice coil 33 to the pivot 31, and is located on the same circumference of the pivot 31. On the other hand, the stopper 50 is formed so that it may be located on the same circumference as the tip part of the coil retaining arms 34A and 34B. And as shown in drawing 5 (a), the stopper 50 regulates the rotating extent by the side of the inner circumference of the magnetic disk 4 of the actuator 30, when one coil retaining arm (arm of another side) 34A hits the stopper 50. As shown in drawing 5 (b), this stopper 50 regulates the rotating extent by the side of the periphery of the magnetic disk 4 of the actuator 30, when the coil retaining arm 34B (one arm) of another side hits the stopper 50. That is, thereby, the seeking range which met the magnetic disk 4 of the magnetic head 32 is regulated.

[0017]As shown in drawing 4 (b), this stopper 50, The inner circumference side stopper surface (inner circumference side restricting part) 50A and the periphery side stopper surface (periphery side restricting part) 50B are formed in the height corresponding to [it is pillar-shaped and] the coil retaining arms 34A and 34B of the actuator 30 in the side provided so that it might project in the upper part from the upper surface of the lower stator 40L. As shown in drawing 6 and drawing 7, if plane view (it is cross sectional view in a field parallel to the arc of the turn of the actuator 30) of the inner circumference side stopper surface 50A is carried out, it is formed in the approximate circle arc with predetermined curvature. Thereby, the inner circumference side stopper surface 50A has the composition of contacting a point or a line, to the coil retaining arm 34A of the actuator 30. On the other hand, the periphery side stopper surface 50B is formed planate, and has the composition of contacting to the coil retaining arm 34B of the actuator 30 in a field. Here, the overhang section 51 projected over the side is formed in the periphery side stopper surface 50B bottom.

[0018]In order that the coil retaining arm 34B of the actuator 30 may make this stopper 50 maintain the state where the stopper 50 was contacted, the magnet (a holddown member, an adsorbing member) 52 is built in it. That is, the crevice 53 is formed in the upper surface at the stopper 50, and the magnet 52 is stored in this crevice 53. It is formed in this crevice 53 so that the nail 53a of a couple may project in that inner direction, and omission from the crevice 53 of the magnet 52 are prevented by this. As shown in drawing 7 (a), this magnet 52 is a plane view abbreviation rectangle, and the adsorption face 52a of the coil retaining arm 34B is established so that it may become the periphery side stopper surface 50B of the stopper 50, and abbreviated parallel. Here, since the magnet 52 demonstrates the adsorption power effectively to the coil retaining arm 34B, it is preferred to bring close to the periphery side stopper surface 50B if possible, namely, to, form the periphery side stopper surface 50B side of the stopper 50 in thin meat if possible. And as shown in drawing 2, the iron piece 35 is formed in the coil retaining arm 34B of the actuator 30 adsorbed by this magnet 52 at the position corresponding to the periphery side stopper surface 50B of the stopper 50.

[0019]As shown in drawing 4, the above-mentioned stopper 50 is fixed to the lower stator 40L. The hole 44 of approximately rectangular shape is formed in the lower stator 40L, and the stopper 50 is inserted in this hole 44. For this reason, it turns to the stopper 50 caudad from the upper part (a contact part, a stopper part) 50U in which the inner circumference side stopper surface 50A and the periphery side stopper surface 50B were formed, and it is formed so that the insert portion (holding part) 55 may project. This insert portion 55 is a common cross-sectional-view rectangle, and that cross-section area is small formed rather than the upper part 50U. Thereby, the step 56 is formed between the insert portion 55 and the upper part 50U. it was shown in drawing 7 -- as -- the insert portion 55 -- the projection dimension from the step 56 -- the board thickness of the yoke 41 of the stator 40L -- a prescribed dimension -- it is set up become large. Thereby, if the insert portion 55 is inserted in the hole 44 of the stator 40L, that insertion size is regulated by the step 56 and the tip part 55a of the insert portion 55 projects caudad rather than the stator 40L in this state. Here, the chamfering portion (taper part) 55b is formed, and the cross section size becomes small gradually at the tip part 55a of the insert portion 55 as it goes to the tip part 55a. Thereby, the insert portion 55 to the hole 44 of the stator 40L can be easily inserted now.

[0020]The lobes (omission prevention parts) 57A, 57B, 57C, and 57D which project in the method side of outside are formed in four sides of the insert portion 55 of a cross-sectional-view rectangle. Here, the lobes 57A and 57C formed in two sides which counter mutually have the lock face 58 which abbreviated-intersects perpendicularly with the board thickness of the yoke 41, and the position of a approximately the same size method on the side of the insert portion 55 from the step 56. Since the lock face 58 is located in the undersurface side of the yoke 41 by this where the insert portion 55 is inserted in the hole 44 of the stator 40L, these lobes 57A and 57C function as a stopper which prevents the insert portion 55 from escaping from the hole 44. The lobes 57B and 57D formed in two sides in which the insert portion 55 remains have the crowning 59 from the step 56 in the position of the board thickness of the yoke 41, a approximately the same size method, or a little bigger size than this, and serve as shape in which the inclined plane 60 was formed towards the side of the insert portion 55 from this crowning 59. Thereby, the crowning 59 is located in the undersurface side of the yoke 41, and makes the insert

portion 55 demonstrate the power which draws the yoke 41 near to the step 56 side by the inclined plane 60 formed in the upper part, where the insert portion 55 is inserted in the hole 44 of the stator 40L. These lobes 57A, 57B, 57C, and 57D are not necessarily formed in the whole width of the side of the insert portion 55, and what is necessary is just to form them by the minimum width that can exhibit a necessary function. As shown in drawing 7 (d), the crevice 61 with the predetermined depth is formed in the apical surface 55c of the insert portion 55. By this crevice 61, it faces inserting the insert portion 55 in the hole 44, and the modification to the inner direction of the portion of the lobes 57A, 57B, 57C, and 57D projected over the side is permitted. This can perform now easily insertion to the hole 44 of the insert portion 55.

[0021]In such a structure, the stopper 50 is being fixed by inserting the insert portion 55 in the hole 44 to the lower stator 40L. At the time of rotation of the actuator 30, the coil retaining arms 34A and 34B will hit from the side to the upper part 50U of the stopper 50, and power which draws this out from the hole 44 for the insert portion 55 by this acts. 57A, 57B, 57C, and 57D which were formed in the insert portion 55 resist this power, and the stopper 50 is prevented from escaping from the hole 44. Here, the periphery side stopper surface 50B side which receives the coil retaining arm 34B of an opposite hand serves as thin meat to having projected over the periphery side the inner circumference side stopper surface 50A where the upper part 50U of the stopper 50 receives the coil retaining arm 34A. For this reason, in the lower end part of the upper part 50U of the stopper 50, when said overhang section 51 formed in the side by projecting rather than the periphery side stopper surface 50B receives the coil retaining arm 34A in the inner circumference side stopper surface 50A, it has composition which raises that bearing power.

[0022]According to composition which was mentioned above, with the coil retaining arm 34A of the actuator 30, and the stopper 50 arranged among 34B. The rotation by the side of the inner circumference of the actuator 30 and the rotation by the side of the periphery of the actuator 30 can be regulated, and the magnetic head 32 of the actuator 30 can be held now on the lamp 13 with the magnet 52 built in the stopper 50. Thus, by having composition which has three functions with the one stopper 50, While the attachment work of the stopper 50 can be managed with once and reduces part mark, working efficiency can be raised, and improvement in the productive efficiency of the hard disk drive 20 and cost reduction can be planned. It also becomes space-saving-ization in the base 21. the stopper 50 -- the whole surface side of the upper part 50U -- the inner circumference side stopper surface 50A -- since the side was made into the periphery side stopper surface 50B on the other hand, it can be considered as very simple shape and structure, and contributes to cost reduction greatly also in this point. Since the periphery side stopper surface 50B was formed according to the flat surface and thinning was carried out, it can make the magnetic attraction of the magnet 52 able to act effectively to the actuator 30, and can ensure maintenance of the actuator 30. On the other hand, in the inner circumference side stopper surface 50A, by considering it as the curved surface shape which projected the stopper 50 over the method of outside, the stopper 50 becomes thick and impact absorption capacity when the actuator 30 hits can be enlarged.

[0023]In addition, such a stopper 50 has composition fixed by inserting the insert portion 55 in the hole 44 formed in the lower stator 40L. This should just form the hole 44 in the lower stator 40L by press working of sheet metal. The lower stator 40L is manufactured

by press working of sheet metal from the first in many cases, and should just form the hole 44 simultaneously in this case at the time of formation of the stator 40L, and there is no necessity for additional processing. In addition, if it is press working of sheet metal, the necessary positioning accuracy of the stopper 50 is easily securable. By these, cost can be reduced on the occasion of attachment and positioning of the stopper 50.

[0024]Although it had composition which attaches the stopper 50 to the lower stator 40L in the above-mentioned embodiment, it is also possible to consider this as the composition directly attached to the base 21. Although it had composition which forms the coil retaining arms 34A and 34B of the actuator 30 by PPS in the above-mentioned embodiment, a problem does not have making this into other construction material. Although the coil retaining arms 34A and 34B were considered as the composition applied to the stopper 50, a projection can be provided in the actuator 30 side in addition to the coil retaining arm 34A and 34B, and it can also have composition which applies the projection to the stopper 50. In addition, although the load unloading type hard disk drive 20 which evacuates the magnetic head 32 on the lamp 13 was mentioned as the example in the above-mentioned embodiment, it cannot be overemphasized that the same art also as things other than a load unloading type is applicable. Unless it deviates from the main point of this invention besides this, it is possible to select the composition quoted by the above-mentioned embodiment, or to change into other composition suitably.

[0025]

[Effect of the Invention]As explained above, according to this invention, it becomes possible to attain increase in efficiency of the manufacturing process of a disk drive device or a hard disk drive, cost reduction, space-saving-ization, etc.

[Translation done.]

[Claim(s)]

[Claim 1]A disk driving source which makes a disk like medium which memorizes data rotate, An actuator which it is equipped with a head which performs read-out and writing of data to said disk like medium, and rotates focusing on a rotating shaft, Have a case which accommodates said disk driving source and said actuator, and said actuator, A disk drive device, wherein a stopper which has a holder part of a couple which projects from said rotating shaft side to the periphery side, and is located on the same circumference, and was fixed to said case side between holder parts of said couple is formed further.

[Claim 2]The disk drive device according to claim 1, wherein said stopper equips one with a holddown member which fixes said actuator after said one holder part has contacted the stopper concerned further.

[Claim 3]The disk drive device according to claim 1, wherein it has further a coil provided in said actuator, and a stator which is fixed to said case side, has two incomes with said coil, and constitutes a voice coil motor and said stopper is being fixed to said stator.

[Claim 4]A hard disk drive comprising:

Disk enclosure which consists of covering which closes a base and the opening

concerned of case shape with an opening.

A disk like medium which memorizes data magnetically and is rotated with a spindle motor.

An actuator which makes the magnetic head concerned seek on the disk like medium concerned by having a magnetic head for writing data to said disk like medium, and rotating a pivot as a center.

A stopper which has a function which is provided in rotating extent of said actuator and regulates a seeking range over the inner circumference side of said disk like medium of said magnetic head, and a function which regulates a seeking range over the periphery side of the disk like medium of the magnetic head concerned.

[Claim 5]The hard disk drive according to claim 4, wherein said stopper equips one with the inner circumference side restricting part which regulates rotation of said magnetic head by the side of inner circumference of said disk like medium, and the periphery side restricting part which regulates rotation of said magnetic head by the side of a periphery of the disk like medium concerned.

[Claim 6]The hard disk drive according to claim 5, wherein said actuator has a holder part of a couple located on the same circumference to said pivot and said stopper regulates rotation of said actuator by contacting said holder part.

[Claim 7]The hard disk drive according to claim 4, wherein it has further a lamp which holds said magnetic head in the state where it was made to evacuate from said disk like medium and said stopper is provided with a magnet which fixes said actuator where said magnetic head is held at said lamp.

[Claim 8]A head which write data to a disk like medium, and an actuator which makes said head seek on said disk like medium, A voice coil motor which has a stator which counters a voice coil and the voice coil concerned of flat shape supported by said actuator, and is made to rotate the actuator concerned to a circumference of a rotation center, Have a stopper which regulates rotating extent of said actuator when seeking said head, and said actuator, A head drive unit, wherein it has an arm of a couple for supporting said voice coil, and said stopper is formed so that it may be located between arms of said couple of said actuator.

[Claim 9]The head drive unit comprising according to claim 8:

A holding part by which said stopper is fixed to said stator.

A contact part which said arm contacts at the end of said rotating extent when it projects from said stator and said actuator rotates.

[Claim 10]The head drive unit according to claim 9, wherein a hole is formed in said stator and said stopper is being fixed to said stator by inserting said holding part in said hole.

[Claim 11]The head drive unit according to claim 8, wherein said stopper is provided with an adsorbing member which adsorbs said one arm, and said adsorbing member is arranged so that a portion which said one arm contacts rather than a portion to which said arm of another side contacts said stopper may be approached.

[Claim 12]A stopper which regulates rotating extent of an actuator which makes a disk like medium which constitutes a disk drive device seek a head which write data along with the disk like medium concerned, comprising:

A portion which contacts when it is pillar-shaped and said actuator reaches the end side of said rotating extent.

A stopper part which has a portion which contacts when the actuator concerned reaches the other end side of the rotating extent concerned.

A holding part which extends along an axis of said stopper part and fixes the stopper part concerned to said disk drive device.

A magnet which adsorbs the actuator concerned when said actuator reaches the end side of said rotating extent and contacts said stopper part.

[Claim 13]The stopper according to claim 12, wherein omission prevention parts which project said holding part to the side and prevent an omission of said stopper are formed.

[Claim 14]The stopper according to claim 12 having a taper part which becomes thin as said holding part goes at a tip.

[Claim 15]The stopper according to claim 12 having the crevice formed in a tip part of said holding part along an axis of the holding part concerned.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a perspective view showing the composition of the hard disk drive apparatus in this embodiment.

[Drawing 2]It is a perspective view of an actuator.

[Drawing 3]In a hard disk drive apparatus, it is a strabism development view showing the relation between an actuator and a stopper.

[Drawing 4]It is a figure showing the fitting structure to the stator of a stopper.

[Drawing 5]An actuator is a top view showing the state where it is located in the inner circumference side of (a) rotating extent, and the state where it is located in the periphery side of (b) rotating extent.

[Drawing 6]They are the figure which looked up at the stopper from (a) slanting lower part, and the figure looked down on from (b) slanting upper part.

[Drawing 7]They are the (a) top view of a stopper, the (b) front view, the (c) side view, and the (d) bottom view.

[Drawing 8]It is a figure showing the composition of the conventional hard disk drive apparatus.

[Description of Notations]

4 -- A magnetic disk (disk like medium), 13 -- A lamp, 20 -- Hard disk drive (disk drive device), 21 -- A base, 23 -- Disk enclosure (case), 30 -- Actuator, 31 -- A pivot (rotating shaft), 32 -- A magnetic head (head), 33 -- Voice coil (coil), 34A -- a coil retaining arm (a holder part, an arm, the arm of another side), and 34B -- a coil retaining arm (a holder part.) An arm, one arm, 40L -- A stator, 41 -- A yoke, 42 -- Magnet, 44 -- A hole, 50 -- A stopper, 50A -- Inner circumference side stopper surface (inner circumference side restricting part), 50B -- the periphery side stopper surface (periphery side restricting part)

and 50U -- the upper part (a contact part.) A stopper part, 51 [-- A tip part 55b / -- A chamfering portion (taper part), 57A, 57B, 57C, 57D / -- A lobe (omission prevention parts), 61 / -- Crevice] -- An overhang section, 52 -- A magnet (a holddown member, an adsorbing member), 55 -- An insert portion (holding part), 55a